Indications & Acute Complications of Hemodialysis

By

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Indications

- Male pt., 21yrs., no significant medical Hx. admitted to ER with:

1. DCL
2. Severe tachypnea & cyanosis
3. HR 130, BP 240/120
4. ABG: Hypoxia – Severe acidosis
5. K 7.4, Sr Cr. 21

THEN?

Contd.,

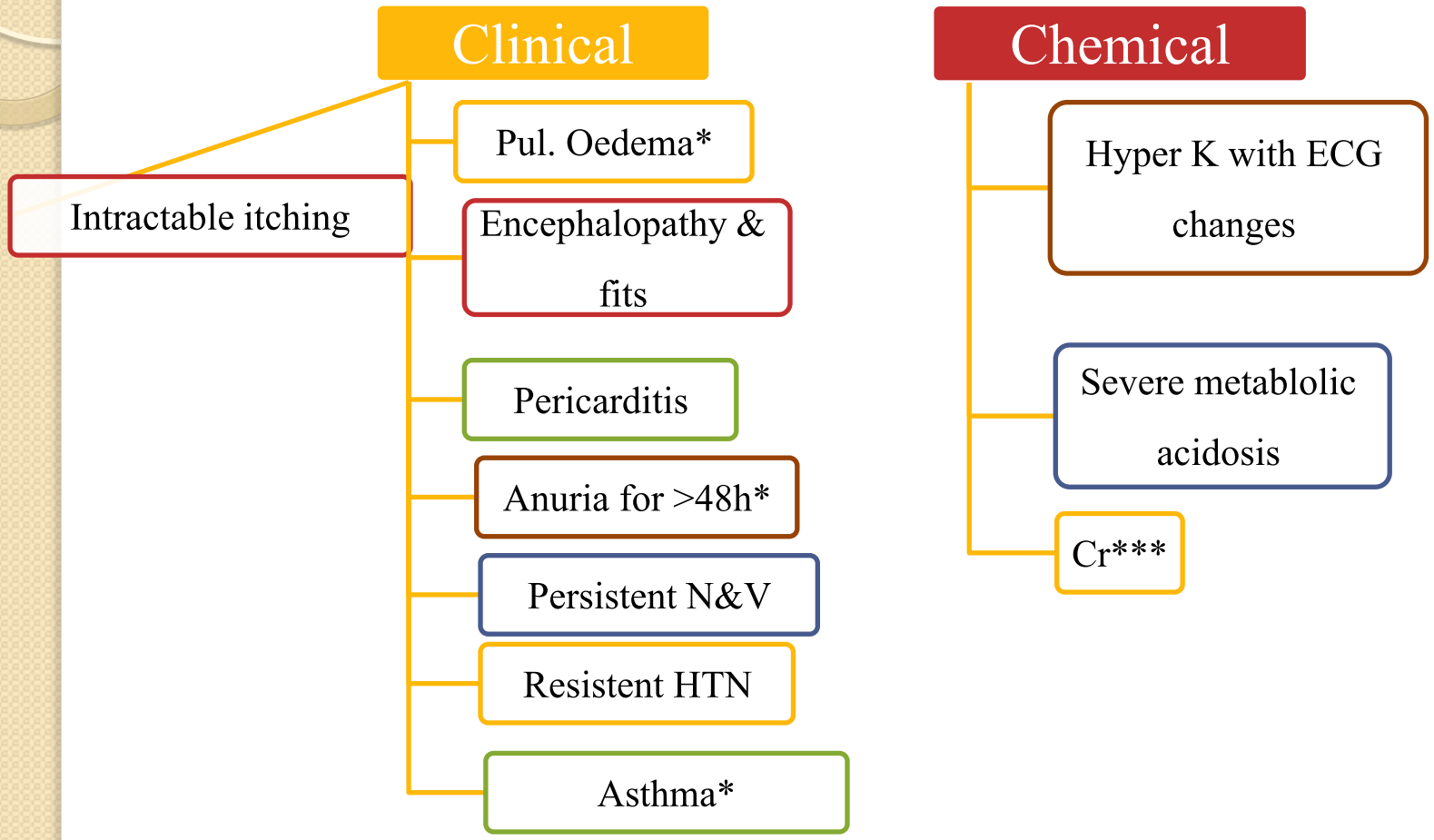
- Male pt., 45yrs., HTNsive, CKD (base CR3-4), admitted to ER with:

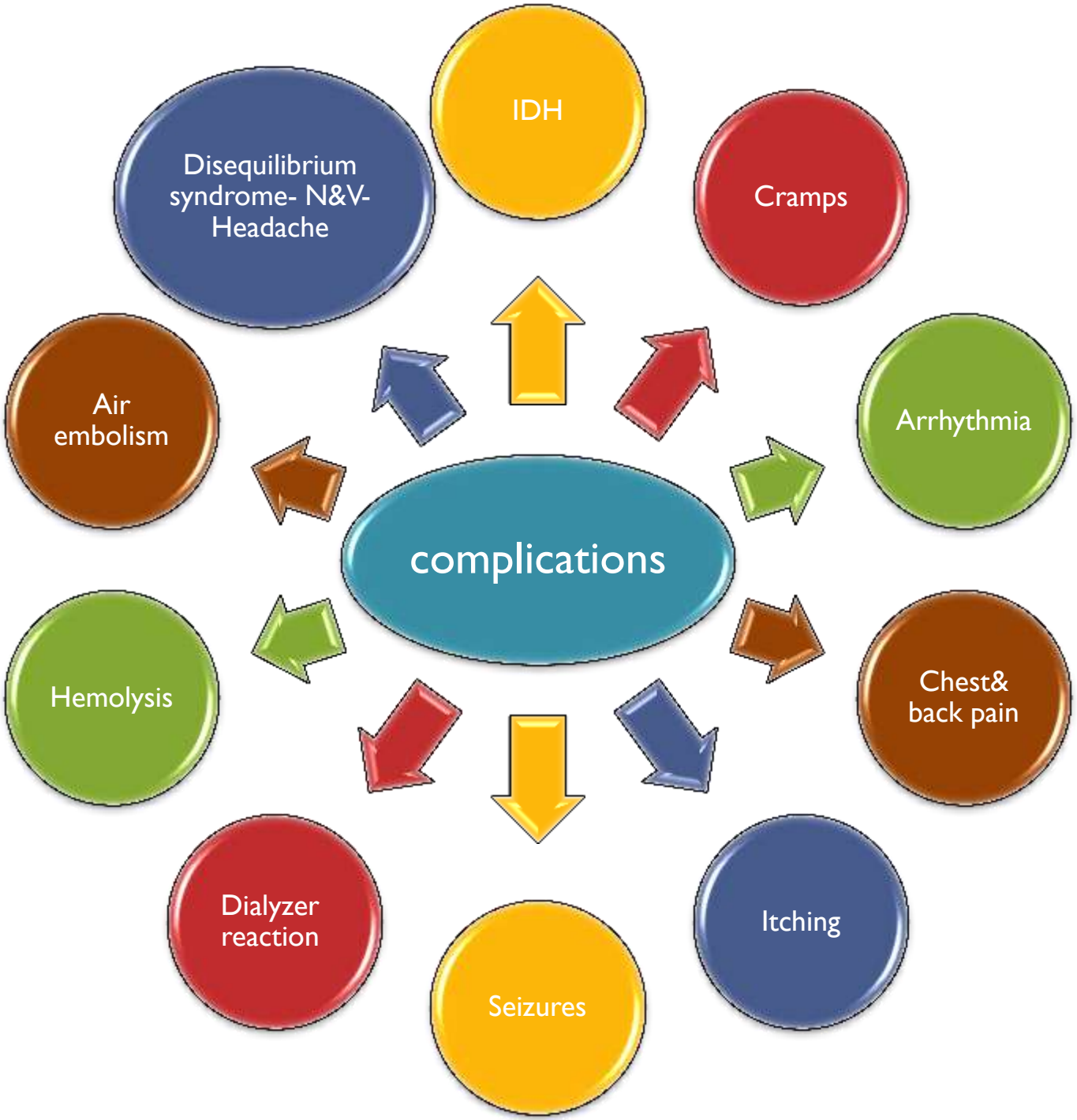
1. Easy fatiguability
2. Mild bil. LL oedema
3. Chest, CV ex----> NAD
4. Sr Cr 7
5. BP 150/90
6. ABG & electrolytes are accepted

THEN?

We deal with PATIENTS not Lab

Contd.,


Clinical
Intractable itching
Pul. Oedema*
Encephalopathy & fits
Pericarditis
Anuria for >48h*
Persistent N&V
Resistent HTN
Asthma*
Chemical
Hyper K with ECG changes
Severe metablolic acidosis
Cr***


IDH
Disequilibrium syndrome- N&V- Headache
Cramps
Air embolism
Arrhythmia
complications
Hemolysis
Chest& back pain
Dialyzer reaction
Seizures
Itching

IDH

- Definition:

A fall in nadir(lowest) syst. Pr <90

OR

A fall of ≥20 mmHg in syst. pr

Volume-related

- Large IDWG****
- Short dialysis time*****
- Low target BW****
- Low dialysate Na

Defective V.C

- High dialysate temp.
- Autonomic neuropathy
- Anti HTNsives***
- Eating***
- Anemia
- Acetate-based dialysate

Cardiac

- Diastolic Dysfunction*****
- Pericardial tamponade
- MI
- Arrhythmia

Others

- Hemorrhage
- Hemolysis
- Air embolism
- Dialyzer reaction*
- Adenosine release
- Hypo Mg, Ca
- Decreased ADH response

DIAGNOSIS AND TREATMENT

- Although occasionally asymptomatic, patients with hypotension may suffer from :
  - light-headedness.
  - muscle cramps.
  - Nausea & vomiting.
  - dyspnea.

PREVENTION

Volume-related				
*Avoid large IDWG *Restrict salt	*Increase treatment time(every other day) *Stick to 4h (EBPG)	Increase urine volume by diuretics if possible	Determine target BW HOW?	Dialysate Na

Cont.,

Defective V.C

Lower dialysate temp. To what extent?	Avoid intradialytic food intake(within 2h)	*Treat anemia *Supply O2	*Midodrine 10mg(1-2h before session) *Sertraline(4-6w), 50mg *Stop antiHTNsives before session	Dialysate K	*Fludrocortisone *ADH

Cont.,

Other factors

Control diastolic dysfunction	Dialysate Ca	ECG for MI, arrhythmia	Hypoglycemia

NO Acetate-based dialysis

Treatment

1. Normal saline 0.9% (100 ml)
2. Nasal O2
3. Slowing BL. Flow rate????????

Muscle Cramps

- Common complication of hemodialysis treatments and mostly involves the muscle of the lower extremities
- Usually occur near the end of hemodialysis treatments.
- High serum CPK is frequent finding

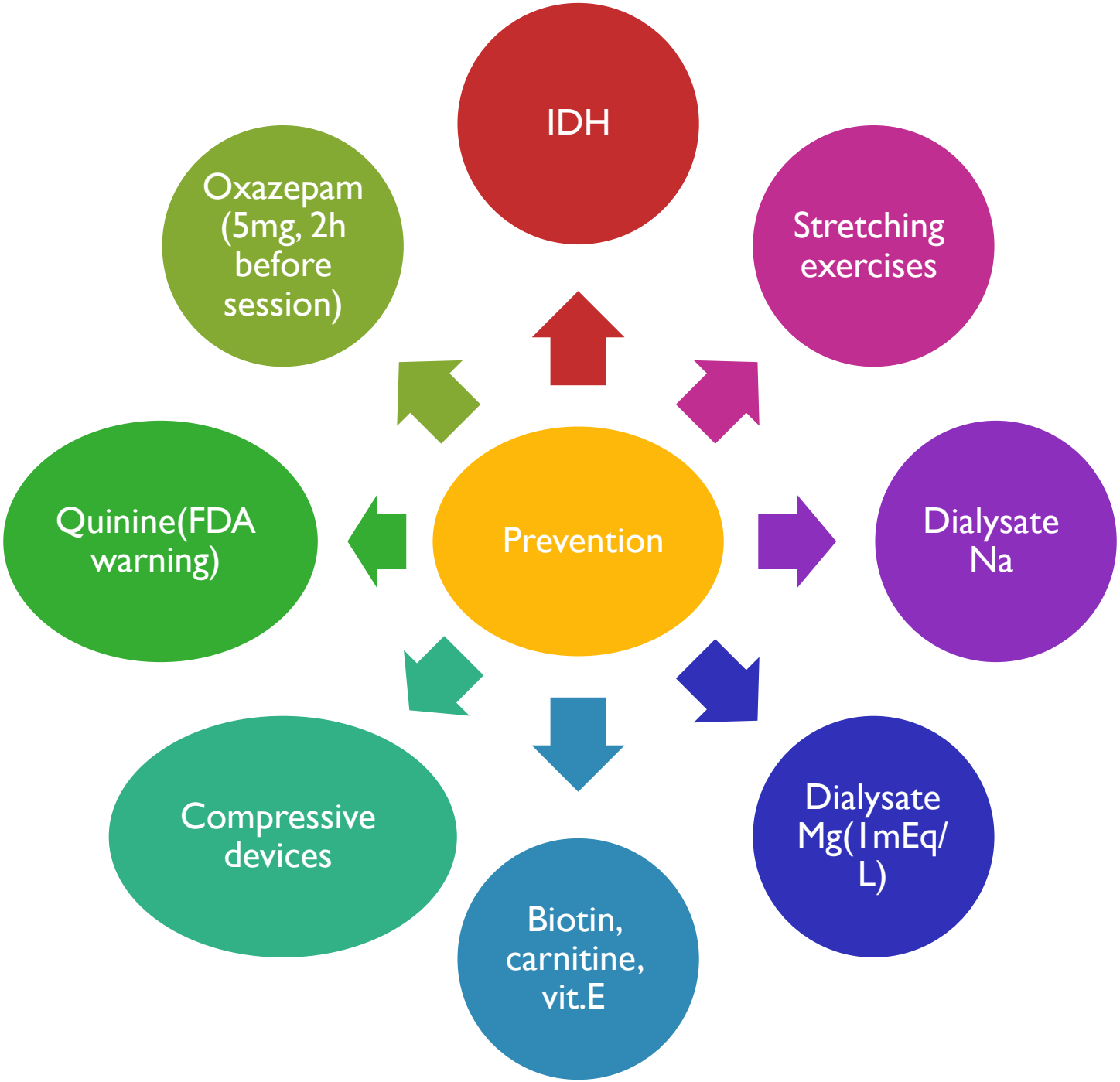
Etiology

- Plasma volume contraction.
- Hypotension
- Tissue hypoxia
- Hypo Na.
- Hypo Mg.
- Hypo K.

Treatment.

- Symptomatic:

1. Forced stretching of afflicted ms.
2. Treat hypotension
3. Normal saline OR D10%


IDH
Oxazepam (5mg, 2h before session)
Stretching exercises
Quinine(FDA warning)
Prevention
Dialysate Na
Compressive devices
Biotin, carnitine, vit.E
Dialysate Mg(1mEq/L)

Dialyzer Reactions

	AE	Symptoms	TTT& prevention
Type A	*Memb(EO,AN) *Contaminated dialysate *Reuse *Heparin	*From coryza to cardiac arrest *Start within 2min. OR delayed 15-30min. After start of session	*Stop session *TTT according to presentation *Change dialyzer *Sterilization
Type B	? complement	mild	

CKD-aPruritus

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Uremic pruritus

Thomas Mettang[1] and Andreas E. Kremer[2]

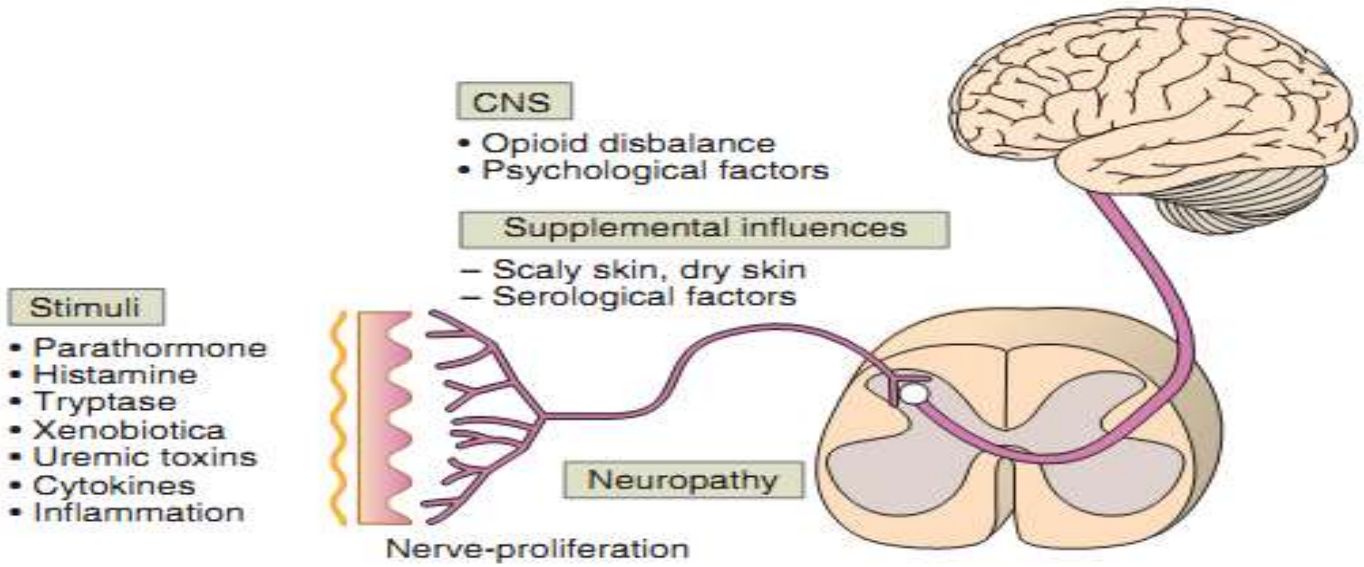

Figure 4 | Schematic synopsis of potential pathogenic factors in chronic kidney disease-associated pruritus (CKD-aP). CNS, central nervous system.

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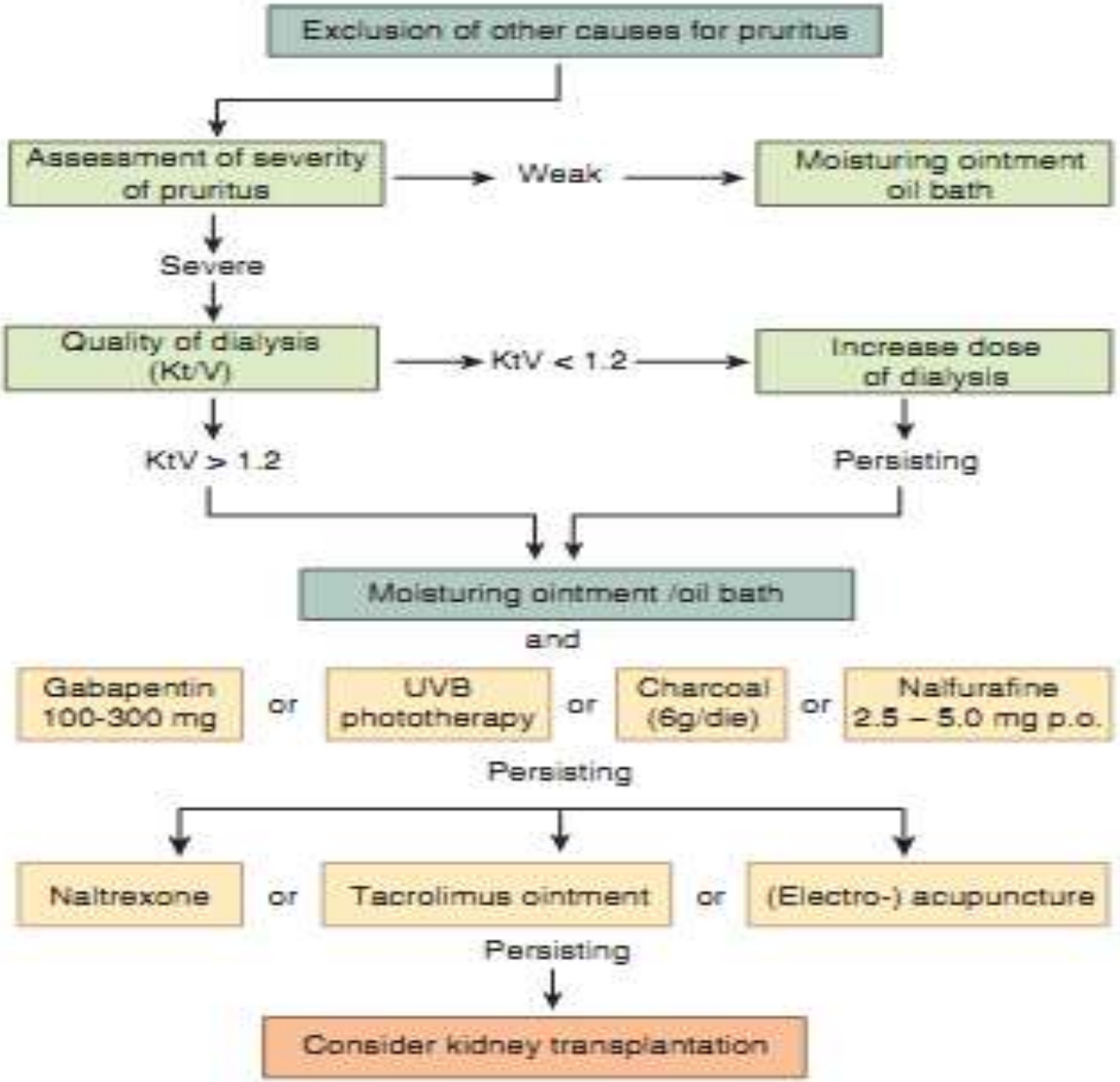

Figure 5 | Therapeutic algorithm in chronic kidney disease-associated pruritus (CKD-aP). Kt/V, urea clearance in relation to urea distribution volume; UVB, ultraviolet light B.

Headach, Nausea & Vomiting

- The longer treatment times together with large degree of urea removal and/or ultra filtration significantly enhance the incidence of headache, nausea, and vomiting during dialysis.

- These symptoms may be apart of dialysis disequilibrium Syndrome (DDS)

Cont.,

- Patients who have headaches on dialysis in the absence of hypotension should be investigated about :
  - Caffien use, which can sometimes precipitate headache
  - Metabolic disturbances (eg, hypoglycemia, hypernatremia, hyponatremia),
  - Subdural hematoma

Dialysis disequilibrium Syndrome

- Neurological disorder described in dialysis patients characterized by neurological symptoms of varying severity that are thought to be due to cerebral edema.
- Usually occurs in new patient started on hemodialysis especially with hign BUN.
- Other risk factor , sever metabolic acidosis , extremes of age , presence of other CNS diseases like seizure disorders.

Pathogenesis

- A reverse osmotic shift induced by urea removal .
- Fall in intracellular pH.

Clinical Manifestation

- The classic DDS develops during or immediately after hemodialysis. Early findings include
  - Headache
  - Nausea
  - Disorientation
  - Restlessness
  - Blurred vision
  - Asterixis
  - More severely affected patients progress to confusion, seizures, coma, and even death.

Differential Diagnosis

- Uremia
- Subdural hematoma
- CVA
- Meningitis
- Metabolic disturbances
- Drug induced encephalopathy

Prevention

1. Don’t be enthusiastic
2. Dialysate Na never low even if pt. hyper Na

Treatment

- In general, symptoms of mild DDS are self-limited and usually resolve within several hours.
- Severe forms:

1. Stop session
2. I.V mannitol
3. I.V steroids
4. Assure patency of airway
5. Manage fits

Chest and back pain

AE:

- Hypotension
- Dialyzer reaction
- DDS
- Angina
- Hemolysis
- Air or pulmonary embolism (rare).

The decision to continue or stop the dialysis treatment because of chest pain is based upon clinical findings.

Hemolysis

Causes

- Blood line narrowing
- Dialysate problem (overheating-hypotonic-contaminated)

Symptoms& Signs

- Chest tightness
- Back pain
- Skin pigmentation
- Ms. Weakness, arrhythmia(hyper K)
- Port-wine blood in venous line with pink plasma
- Fall in hematocrite

Management

- Stop session, DON'T return blood
- Treat hyper K, anemia
- Hospitalize for observation

Air embolism

- Disconnection of connecting caps and/or blood lines can also lead to air embolism in patients being dialyzed with central venous catheters.

- In the seated patient, air tends to migrate into the cerebral venous system without entering the heart leading to loss of consciousness and seizure while in those who are recumbent, air tends to enter the heart and then the lungs leading to dyspnea, cough, and perhaps chest tightness.

Cont.,

- Treatment :

1. Clamping the venous line and stopping the blood pump
2. Positioning of the patient on the left side in a supine position with the chest and head tilted downward.
3. Cardio-respiratory support
4. The administration of 100 percent O_2 by either mask or endotracheal tube
5. The most important aspect of air embolism is prevention by the adequate function of monitoring devices on dialysis machines

THANK YOU